

Earth Syst. Sci. Data Discuss., referee comment RC2
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Comment on **essd-2021-174**

Anonymous Referee #2

Referee comment on "HydroSat: geometric quantities of the global water cycle from geodetic satellites" by Mohammad J. Tourian et al., Earth Syst. Sci. Data Discuss., <https://doi.org/10.5194/essd-2021-174-RC2>, 2021

The paper presents a rather unique dataset that provides several hydrological variables obtained with satellite data related to: 1) water level time series of rivers and lakes; 2) surface water extent of rivers and lakes; 3) terrestrial water storage anomaly; 4) water storage anomaly for lakes and reservoirs; 5) river discharge estimates for rivers. Globally, I found the idea to collect all these variables together quite interesting and useful for hydrological applications even if the dataset is far from to be exhaustive and complete, at least for some variables: for example, water level and water storage anomaly cover quite all the globe, whereas the surface water extent and the river discharge are estimated only for some stations (and sometimes not coincident).

About the paper, it is very long with a lot of information and a few innovative elements. Actually, most (maybe all) of the procedures to derive the hydrological products have been already published. Therefore, the paper shows a collection of already published algorithms and procedures with a remark of the main results and validation. I really appreciated the comparison with other datasets, but I am quite dubious about the general content.

In addition, the citation to four unpublished papers (Behnia et al. and Elmi et al.) makes this paper more uncertain for two reasons: first, the content described in the papers is not still accepted by the scientific community, and if from one hand it is good for the originality of the content of this article, on the other hand, no many details are provided on that specific procedures to allow the acceptance; second, no way to check the under review or submitted papers, to verify the originality of the content of this paper.

So, despite it is a big paper with a lot of science behind, I think it is not good enough to demonstrate the novelty of the datasets.